#9

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Shao, et al.

Attorney Docket No.: 1-10-3

Ser. No.: 09/464,811

Examiner: L. Cruz

Filed: 12/17/99

Art Unit: 2815

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

PETITION UNDER RULE 144 REQUESTING THE COMMISSIONER TO REVIEW AND OVERRULE RESTRICTION REQUIREMENT

Applicants petition the Commissioner of Patents and Trademarks to intervene in the above-referenced application and now reverse the restriction requirement made final. By all appearances the restriction requirement was made without any basis in fact and is in complete error. This petition is filed in accordance with Rule 144 and is filed prior to an appeal from the examiner's final rejection of the elected claims. This petition is necessitated because the examiner has not addressed the substance of applicants' argument.

1. STATUS OF THE APPLICATION

The elected claims in the application were finally rejected on 01/03/01. A notice of appeal was filed on 04/02/01. A petition for a one month extension of time is filed herewith in order to rightfully file this petition (in response to the restriction requirement made final) and to subsequently file an appeal brief in response to the final rejection of the claims.

2. BACKGROUND

In a telephone conversation on May 17, 2000 the examiner notified the undersigned of intent to impose a restriction requirement between claims 1 – 21 and claims 22 – 33. At that time a provisional election, with traverse, was made to prosecute claims 1 – 21. In the office action mailed May 17, 2000 the examiner set forth the following:

A. Claims 1 – 21 (Group I) are drawn to a semiconductor device, classified in class 257, subclass 758, while claims 22 – 33 (Group II) are drawn to a method for making a semiconductor device, classified in class 438, subclass 1+.

B. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP Sec. 806.05(f)).

C. In the instant case unpatentability of Group I invention does not necessarily imply unpatentability of Group II invention, since the device of Group I invention can be made by a materially different product [sic] than that disclosed in independent claim 22. For example, the device of Group I could be made by selectively depositing the second insulating layer, so that no etching is necessary after the depositing of the upper level of interconnect members over said second insulating layer.

D. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

In applicants' response to the office action mailed May 17, 2000 the restriction requirement was shown to be in error. However, in the final office action mailed January 3, 2001 the examiner made the restriction requirement final without addressing the merits of the traversal. Rather, the examiner misstated the applicants' basis of the traversal as follows:

> "depositing the layer so that etching is not necessary does not suggest another method for producing the claimed semiconductor device"

and then the examiner merely concluded that such

> "is not found persuasive because the above does in fact propose another method ..."

The applicants' actual argument concerning the withdrawn method claims states in part:

> "claim 22 reads on the very process thought [by the examiner] to show that a device of Group I can be made by a materially different process. It is not apparent there exists any process to make the product of Group I, which differs materially from the process of Group II."

The examiner has yet to respond to this deficiency in the basis for the restriction requirement.

3. OBJECTIONS TO THE RESTRICTION REQUIREMENT ARE BASED IN PART ON QUALITY CONCERNS

The Office is required to analyze the substance of claims before making restriction requirements. Otherwise, an insufficient or piecemeal examination may result. In the present application, if such analysis has been performed, the results indicate that it is of uncertain technical merit. Further, competent searches will normally be broader

than a single subclass and restrictions should not be justified because searches required for two different claims are not 100 percent identical. In fact, contrary to conclusion that the inventions are distinct, the examiner has searched two of the Group II subclasses in the course of examining the Group I claims.

However, to the extent art relevant to the claims of Group I may be present in still other subclasses relating to the claims of Group II, the applicants are disappointed that the examiner has not provided a more comprehensive search. This seems especially relevant in view of the marginally relevant art which the examiner cites to sustain a final rejection of the elected claims under Section 102. In fact, it appears that a more comprehensive understanding and examination of each claim group will result from examining all of the claims at once. For these reasons the restriction requirement should be reversed. At a minimum it is requested that the examiner be directed to search all of the classes relevant to the Group II claims in order to assure that the most pertinent art is considered.

4. TECHNICAL ERROR RENDERS IT PROPER TO REVERSE THE RESTRICTION REQUIREMENT

The product as claimed (Group I) cannot be made by another and materially different process than that covered by the Group II claims. This fundamental mistake in the restriction requirement is made clear by first referring to the exemplary embodiment described at page 6 and illustrated in Figure 2 of the application. There, the first insulative layer of method claim 23 corresponds to 140a, and the remains after removing portions of the claim 23 second insulative layer correspond to residual elements 220. That is, the residual elements 220 are what remain of a larger deposited insulative layer 140 (again, the claim 23 second insulative layer) previously underlying the

metallization level 180 (as shown in Figure 1a). Note, Figure 2 illustrates a partially completed structure at a time after portions of the claim 23 second insulative layer 140 (see again Figure 1a) have been removed but prior to forming a third insulative layer in the very regions of the second insulative layer 140 that have been removed. According to applicants' teachings, the regions 220 under conductive members 200-180 remain after anisotropic etching of the layer 140.

As best understood, if the examiner were correct, then the regions 220 could have been "selectively deposited" as shown in Figure 2 without having to first form (as shown in Figure 1a), and then etch away, portions of the larger deposited insulative layer 140 previously underlying the metallization level 180. The examiner has not proposed and cannot propose how one might possibly "selectively deposit" the insulator regions 220 to make the completed structure, e.g., see Figure 3.

While the claims are not limited to the illustrated embodiments, this discussion at least confirms that the examiner's assertions cannot be generally correct. That is, it seems impossible to selectively deposit insulator only in the regions underlying the conductive members 200-180. For all of the embodiments disclosed in the application the examiner's proposal is, at best, speculative.

Nor is it apparent that any other embodiment of a Group I device exists for which the examiner's assertions are technically feasible. (This is not to say that the claims of Group I or Group II would not read upon such structures or methods if they could be conformed to the examiner's approach.)

Based on reasons more fully described in Section 5 below, there is no process, materially different from that of the Group II claims, which is known to result in the

completed structure according to the Group I claims; and because applicants have clearly identified deficiencies in the examiner's argument, it has been incumbent upon the examiner to carry the burden of showing that her approach can result in at least one feasible and materially different method of making a Group I device. The examiner has failed to carry this burden and the requirement cannot be sustained.

5. OTHER TECHNICALLY FEASIBLE INTERPRETATIONS OF THE EXAMINER'S PROPOSED PROCESS ARE NOT MATERIALLY DIFFERENT.

The plain language selective deposition means that deposition occurs in selected regions while preventing deposition in non-selected regions. As best understood (and as explained to the examiner in the response mailed May 17, 2000) the "selectively depositing" step might possibly be effected by first depositing an additional "third insulator" to only fill regions that would not be occupied by the regions 220. This way the regions 220 may later be selectively formed only in voids existing about the "third insulator". However, such a "selectively depositing" step would appear to be covered by the Group II claims. That is, such an approach would require deposition of an additional "third layer" followed by etching to remove portions of that "third layer" of insulator -- to create room for the selective deposit of regions 220 -- and claim 22 (Group II) would thus read on the very process the examiner seeks to identify as materially different from the process of the Group II claims!

It is also possible the examiner intended but did not state that the proposed step of "selectively depositing the second insulating layer, so that no etching is necessary ..." should occur prior to "depositing of the upper level of interconnect members over said second insulating layer." However, such action would be completely inconsistent with processing steps used to create metallization levels. By way of example, consider a

subtractive metal etch process, which requires a relatively plane surface for metal deposition, e.g., by sputtering, followed by patterning and etch steps. Here, the examiner's proposal would produce pillars or stacks along the very deposition surface. Such a nonuniform surface is simply unsuitable for deposition and patterning of interconnect. An example of metal deposition is at page 5, lines 29 ff in the application. The examiner's proposal would apparently also result in interconnect lines on two different levels of metallization coming into contact, i.e., shorting one another.

The examiner's proposal is also inconsistent with processing to create Damascene metallization levels. A Damascene process requires that, after a blanket deposit of insulator, trenches be etched in the insulator for metal deposition, e.g., by electroplating. If the insulator is selectively deposited in locations corresponding to the regions 220 in Figure 2, then trenches cannot be formed therein for Damascene interconnect. A Damascene interconnect system according to the invention (and covered by the claims of Groups I and II) is illustrated in Figures 8a and 8b.

In summary, all possible constructions of the examiner's "selectively depositing" proposal that are apparent to the undersigned have been explored. To the extent a construction appears feasible it is not materially different than that defined in the Group II claims. No materially different construction is apparent. If the examiner knew of a viable method -- other than that defined in the Group II claims for depositing the second insulating layer [of claim 1] -- so that no etching of the second insulator level is necessary -- then it was incumbent on the examiner to present such a method in the final office action. A mere statement that applicants' traversal is not found persuasive is wholly deficient as a basis for making the requirement final.

6. CONCLUSION

It is not apparent there exists any process to make the product of Group I, which differs materially from the process of Group II. Except for providing brief conclusory statements to the contrary, the examiner has not countered applicants' basis for traversal.

The technical errors in the examiner's restriction requirement have been described in detail. There are no statements in the record which run counter to a conclusion that the examiner's argument is fraught with technical error. For all of these reasons the restriction requirement is in error and applicants are entitled to have all of their claims fully examined in this application. Intervention by the Commissioner to reverse the restriction requirement is therefore requested.

Respectfully submitted,

By: Ferdinand M. Romano

Ferdinand M. Romano
Reg. No. 32,752

Agere Systems, Inc.

Dated: 26 June 2001